

circuit board ), which is able ready to pack in a folding way inside a small machine such as a camera. The FPC also needs a resist, called a cover lay or a cover coat, to serve for the limitation of soldering positions and the protection of circuits on the printed circuit board. The cover lay is formed on the FPC by thermal pressure after the polyimide or the polyester having an adhesive layer is punched out into a designated shape. The cover coat is formed by printing and curing a thermosetting or photosetting ink.

For the resist to use for the limitation of soldering positions and the protection of circuits in FPC, a polyimide cover lay having excellent flexibility is often applied because the flexibility is the especially important property. The cover lay, however, needs a high-priced metal mold for punching out and a manual work for bonding the punched-out films, together with the adhesive agent projected out, causing a low production yield and a high production cost. The drawback makes it difficult to promote the FPC market and to cope with the recent high-density technology.

On the background art, it has been desired to provide a photosensitive resin composition, especially a photosensitive film to form a cover lay that has excellently a high precision and a high reliability in size precision and in resolving power for a photographic development (a means for picturing an image by developing succeeding to an imaging

exposure). A photosensitive resin composition for forming a soldering mask was attempted to apply for the object. The composition included a photosensitive resin composition that contained an acrylate polymer and a photopolymerizable monomer as the main component (JP Laid-Open No.56018/1978, JP Laid-Open No.1018/1979); a good heat-resistant photosensitive resin composition that contained a photosensitive epoxy resin having chalcone groups on the main chain and an epoxy resin-curing agent as the principal component (JP Laid-Open No.82073/1979, JP Laid-Open No.62636/1983); a composition that contained a novolac type of epoxy acrylate having epoxy groups and a photopolymerization initiator as the principal component (JP Laid-Open No.272/1986); and a photosensitive resin composition for forming a soldering mask that was ready to develop in an excellently safe and economical alkaline solution, containing a polymer having carboxylate groups, a monomer, a photopolymerization initiator and a thermosetting resin as the principal component (JP Laid-Open No.73148/1973, JP Laid-Open No.178237/1982, JP Laid-Open No.42040/1983, JP Laid-Open No.151152/1984). Any composition of them, however, had insufficient flexibility.

The present invention is intended to solve the above problem, that is, to provide a resin and a resin composition that is water-soluble and is ready to cure by active energetic

ray. The resin and the resin composition thereof of the present invention can be diluted or dispersed with water to use, can be easily washed with water from a painting or irradiating set, or can be applied to a photoresist for developing in water or an aqueous alkaline solution.

The present invention also relates to a resin composition, a photosensitive film thereof, and a cured product thereof that are useful for a printed circuit board, more particularly to a resin composition and a photosensitive film thereof that are useful for the soldering resist for a flexible printed circuit board, the plating resist, and the interlayer dielectric material for a multi-layer printed circuit board, have excellent power for development, and can provide a cured product coated with an excellently adhesive, flexible (bendable), soldering heat-resistant, chemical resistant and gold plating-resistant surface membrane; and the cured product.

The present invention, if applied for a photoresist, is intended to provide a resin composition that can cope with the present high-density technology of a printed circuit, is excellent in photosensitivity to active energetic ray and is good to deal with, enabling to form a minute image through light exposure and development done in an organic solvent, water, or an aqueous dilute alkaline solution; a photosensitive film thereof; and a cured product thereof. The resin composition also can form the cured membrane by thermosetting in the post-curing